

# Effectiveness of physiotherapy treatment for post chikungunya arthralgia

Mohammad Habibur Rahman, Nasirul Islam, Md. Obaidul Haque, Md. Zahid Hossain, Samena Akter Kakuli, Nowab Reza Md. Rashif

## ABSTRACT

**Aims:** Chikungunya virus is an arthropod-borne *Alphavirus* primarily transmitted by *Aedes* mosquitoes. The disease exhibited by high grade fever and in the resolving time characterized by arthralgia. Though potential chemical mediators exaggerate the symptoms, a combination of direct tissue and cell damage caused by viral replication and indirect immune activation responses in the target tissues causes surrounding muscle atrophy, pain and disability in daily activities. Therefore, physiotherapy treatment plays an important role among recovering patients. **Methods:** A pre-test and

post-test study design was used to evaluate the effectiveness of physiotherapy treatment to reduce pain and minimize disability level among patients with chikungunya arthralgia. Among the 10 participants, the mean ( $\pm$ SD) age was  $38\pm 9$  and 3(30%) were males and 7(70%) were females. Among the 10 participants, 3 complained of pain in lower back and knee joint, 3 complained of pain in lower back and ankle joint and 4 had pain in neck and shoulder region. **Result:** General pain intensity at rest was found ( $p < 0.04$ ) effective after application of dose based physiotherapy treatment. Besides, disability level was also analyzed and results found that after application of physiotherapy treatment statistically significant ( $p < 0.01$ ) level of disability was minimized and patient improved their functional status and level of independence. In the individual eight sections of health assessment questionnaire (HAQ), significant outcome found was found such as arising ( $p = 0.040$ ), eating ( $p = 0.008$ ), hygiene ( $p = 0.016$ ), grip ( $p = 0.034$ ) except dressing ( $p > 0.05$ ), walking ( $p > 0.05$ ) and activities ( $p > 0.05$ ). **Conclusion:** There is limited trial on the efficacy of physiotherapy management of recovering chikungunya patients. However, this study have drawn a guideline for the management of pain and disability following chikungunya.

**Keywords:** Arthralgia, Chikungunya, Physiotherapy

## How to cite this article

Rahman MH, Islam N, Haque MO, Hossain MZ, Kakuli SA, Rashif NRM. Effectiveness of physiotherapy treatment for post chikungunya arthralgia. Edorium J Public Health 2017;4:69–75.

Article ID: 100017P16MR2017

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Received: 17 August 2017  
Accepted: 28 September 2017  
Published: 20 November 2017

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doi:10.5348/P16-2017-17-OA-9

## INTRODUCTION

Chikungunya is a viral disease caused by *Aedes* mosquitoes which showed as outbreak in southern Tanzania in 1952 [1]. Since then, it has become a worldwide concern and listed as a priority by the Scientific Leadership Group for the Global Virus Network [2]. The disease is not confined to Africa nowadays rather it is being out breaking in the South-East Asia region [3]. The incubation period after being bitten by an infected mosquito can range from 2–12 days, most commonly between 3–7 days and the individuals who become infected, 72–97% of them will develop symptoms [4]. The disease may evolve in three phases: acute or febrile (lasting up to 10 days), sub-acute (11–90 days), and chronic (>90 days). Approximately, 50% of people who experience acute infection develop chronic joint pain that can last months to years [5]. Besides, most patients recover fully. Symptoms characteristic of an acute infection includes biphasic high fever lasting from a few days to a few weeks. Back pain, fatigue, myalgia and arthralgia may or may not present with joint swelling and these symptoms usually last for weeks. Headache, insomnia, nausea, and vomiting may also be present. When the skin is involved, 50% of patients present with a maculopapular rash. The presence of hypertension, diabetes and heart disease is also associated with an increased severity of infection [6]. World Health Organization guidelines (2008) found fever (92%) usually associated with arthralgia (87%), backache (67%) and headache (62%) of patients. Despite the improved understanding of joint damage associated with infection by viruses, the cause of persistent symptoms remains unresolved. The inflammatory response of the host, the presence of viral products in macrophages and joint tissues, and auto-immune process may be involved in the pathogenesis. Different joint manifestations during different phases of chikungunya fever have been described in literature, including arthralgia, inflammatory arthritis, synovitis, tenosynovitis and bursitis. However, experimental models of arthritis induced by viruses suggest that the pathogenesis is the result of a combination of direct tissue and cell damage caused by viral replication and indirect immune activation responses in the target tissues. Due to chikungunya different cytokines, chemokines and other inflammatory mediators are produced. These chemical mediators increase the intensity of inflammation in the acute phase. In response to nature, progression of the disease macrophages and T lymphocytes replicates and cause dysregulation of inflammation. Consequently, these process leads to the expression of other inflammatory

proteins responsible for damaging the joint in the chronic phase [7, 8]. Despite of its pathogens is chemical in nature, mechanical problems such as atrophy in muscle, decrease aerobic capacity, restricted joint range of motion exaggerated by pain and prolong immobility following the acute phase of fever. As per World Health Organization (2008) guidelines physiotherapy treatment plays an important role in minimizing arthralgia following chikungunya. Due to its complex nature in progress, number of chikungunya fever and arthritis patient increased among the inhabitants of Dhaka city. One online newspaper published that 196 patients with chikungunya was identified between May to June 2017 in Institute of Epidemiology, Disease Control and Research (IEDCR) and 45 infected patients were also found at Bangabandhu Sheikh Mujib Medical University (BSMMU) [9]. Besides, World Health Organization (WHO) recommended for physiotherapy to minimize joint pain and disability after completion of acute phase of the disease.

The specific objectives of the study were to find out the socio-demographical and medical information of the participants, to evaluate the effectiveness of physiotherapy treatment to reduce pain and minimize disability level among patients with chikungunya arthralgia.

## METHODS AND MATERIALS

### Study design

Pre-test and post-test study design was selected to evaluate the effectiveness of physiotherapy treatment for patients with chikungunya arthralgia.

### Study site

Outpatient unit, Department of physiotherapy, Centre for the Rehabilitation of the Paralysed (CRP), Mirpur-14, Dhaka, Bangladesh.

### Study period

The study duration was from May 2017 to August 2017.

### Sample

Initially 21 patients were assessed for eligibility. Based on the following inclusion criteria, 10 patients were selected as participants of the study.

### Inclusion criteria

Diagnosis of chikungunya fever, history of suffering from chikungunya fever two weeks back from the onset of disease, complains of joint pain but did not have fever and any age ranges.

## Exclusion criteria

Patient suffering from existing chikungunya fever.

## Ethical consideration

Permission was taken from Institution Review Board of Bangladesh Health Professions Institute (BHPI), the academic institute of Centre for the Rehabilitation of the Paralyzed (CRP). Written consent was obtained from all participants before enrollment of this study.

## Research instrument

Pain was assessed by 10 cm numerical pain rating scale (NPRS) and disability was assessed by health assessment questionnaire (HAQ). Data was collected before starting of treatment and after completion of six sessions of treatment. Patient received treatment in the department two times per week for three weeks.

## Treatment protocol

The treatment protocol was applied based on WHO guidelines on chikungunya management in 2008 adjunct as per recommendation of a review article conducted in Brazil, physiotherapy is a priority treatment option as a part of non-pharmacological management and should be started from the sub-acute phase of the disease process [6]. During the first week of physiotherapy treatment of recovering chikungunya patients received ice compression for 10 minutes for 2–3 hourly if patient showed the symptoms of joint swelling, active assisted movement within the pain free range as per patient tolerance, non-weight bearing exercise especially in the lower limb joints. The patients were advised to perform those activities 3–4 times in a week depends on patient's condition. In the second week of treatment, patient received pulley assisted exercises, isometric exercise, and close kinetic chain exercises using self-body weight as per patient tolerance. In the third week of treatment, patients were advised to continue mild form of aerobic and stretching exercise. In addition, patients were advised to perform home exercise program consisting of active exercises of upper and lower limb joints, low effect aerobic exercise such as walking in the corridor for five minutes with comfortable pace, static stretching exercise of major muscle groups and hold for 10 second in each muscle. Patients were also advised to perform home exercise programs two sessions daily for 20 minutes in each session. Four trained physiotherapists delivered physiotherapy treatment for joint pain management.

## Data analysis

Both pain and disability was analyzed in the form of inferential statistics by Wilcoxon signed rank test by using SPSS version 22.

## RESULTS

Among the 10 participants, the mean ( $\pm$ SD) age was  $38\pm 9$  years and among them 3 (30%) were males and 7 (70%) were females. The occupational categories showed housewife was 4(40%), service holder was 4(40%) and business was 2(20%). The mean ( $\pm$ SD) of joint pain duration was  $10\pm 2$  days (Table 1). Among the 10 participants, 3 complained of pain in the lower back and knee joint, 3 complained of pain in the lower back and ankle joint and 4 had pain in neck and shoulder region (Table 2).

The mean pain status of pre-test scores was 6.70 cm and post-test score was 5.40 cm (Figure 1). General pain intensity at rest was found ( $p < 0.04$ ) effective after application of dose based physiotherapy treatment in which calculation was done by using Wilcoxon signed rank test.

Disability level was assessed by HAQ. Different levels of HAQ score was described in Figure 2. However, disability level was also analyzed and according to the study finding, statistically significant improvement ( $p < 0.01$ ) was found in disability reduction. Alongside, patients were improved in their functional status and level of independence. In the individual eight sections of HAQ questionnaire, all parameters are found to be statistically significant except dressing, walking and activities (Table 3).

Table 1: Demographic profile of participants

Variable	Outcome
Age (in years), Mean $\pm$ SD	38 $\pm$ 9
Gender	Male, 03 Female, 07
Occupation	Housewife, 4 Service holder, 4 Business, 2
Living area	Urban, 10 Rural, 00

Table 2: Medical information of participants

Variable	Outcome
ESR (mm in 1 <sup>st</sup> hour), range	30–90
Anti-chikungunya IgM Ab	Positive, 10 Negative, 00
Morning stiffness	Yes, 10 No, 0
Subside of fever (days), Mean $\pm$ SD	10 $\pm$ 2
Maculopapular rash at onset	Yes, 4 No, 6
Joint Pain duration (days), Mean $\pm$ SD	8 $\pm$ .5

Table 3: Significant level in different sections of health assessment questionnaire

Sections	Wilcoxon Sign Rank Test p	Remarks
Dressing	0.250	Not Significant
Arising	0.040	Significant
Eating	0.008	Significant
Walking	0.156	Not Significant
Hygiene	0.087	Significant
Reach	0.004	Significant
Grip	0.034	Significant
Activities	0.236	Not Significant

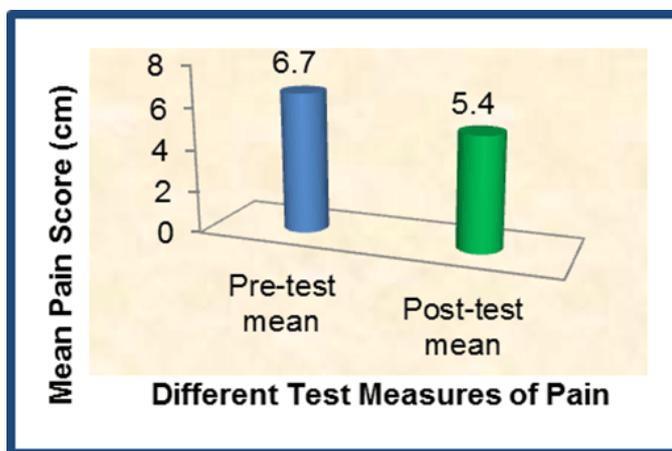


Figure 1: Comparison of pain level in pre-test and post-test measures.

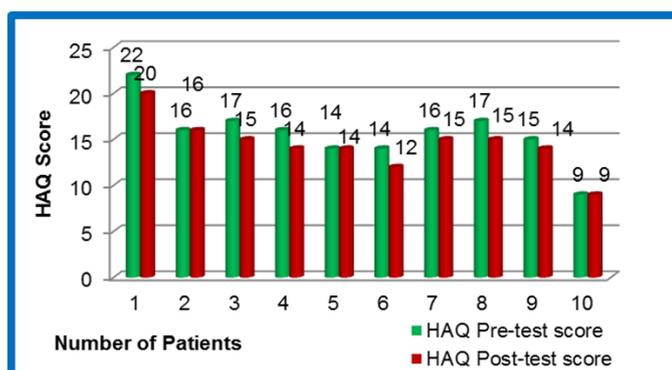


Figure 2: Comparison of HAQ score between pre-test and post-test score.

DISCUSSION

In the current study, among the 10 participants, the mean ( $\pm$  SD) age was  $38 \pm 9$  years and among them 3 (30%) male and 7 (70%) were female. In addition, every participants had history of arthralgia and mean duration

( $\pm$ SD) of subside of fever was  $10 (\pm 2)$  days. However, one study conducted for a case series of chikungunya patient in Bangladesh and found age range of 20–50 years of patient. All of them had complained of arthralgia of variable durations lasting from two to three weeks [10]. In the current study, the mean ( $\pm$ SD) pain status of pre-test scores was  $6.70 \pm 1.16$  cm and post-test score was  $5.40 \pm 1.07$  cm. The pain status was measured referencing the most affected joint and its level of pain perception in a numerical pain rating scale. General pain intensity at rest was found ( $p < 0.04$ ) effective after application of dose based physiotherapy treatment. In contrast from the best knowledge of the researcher, no study yet conducted to find out the efficacy of physiotherapy treatment around the globe. However, disability level was measured by in one cross sectional study and found 16.2% patients suffered from moderate to severe disability 18 months after the acute infection [11]. From the best knowledge of the researchers no study till the date evaluated the efficacy of physiotherapy treatment arthralgia following chikungunya arthralgia. In fact, exercise therapy preferably helps to break down of adhesions, influencing the cellular processes of healing, improving lubrication and restoring normal joint mechanics. The entire physiological process helps to preserve normal movement. Actually, several research publications have recommended physiotherapy as a tool for managing chronic pain. Physiotherapy can be a stand alone alternative to drugs in the management of joint, tendon and nerve-related pains [12]. The possible limitation of this study for generalization was its limited number of sample. The reason for limited number was due to first time quick outbreak of chikungunya in Bangladesh and role of physiotherapist in pain and arthralgia management was not circulated by government earlier. Besides, initiatives from government, improve awareness among mass people and referral from physician encourage patients to seek for physiotherapy treatment. Pain was measured only in one joint based on severity despite of multiple joint involvements which was regarded as the main confounding variable in the study. The authors recommend a randomized clinical trial including large sample in the management of chikungunya patients in future time in Bangladesh.

CONCLUSION

Chronic symptoms of chikungunya led to severe disability because of joint pain and subsequent immobility. Pain is the most common clinical manifestation of chikungunya, is difficult to control, compromising the quality of life of affected patients. There is little known about the physiotherapy protocols for managing the pain caused by *Chikungunya virus*; hence, it was necessary to produce a guideline to diagnose and appropriately manage pain and residual disability among patients with *Chikungunya virus*. However, this study forms

a foundation for importance of dose and stages based physiotherapy management for chikungunya patients.

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## Acknowledgements

We would like to acknowledge Md. Fazlul Karim Patwary, Associate Professor of Statistics, Jahangirnagar University, Savar, Bangladesh for support us in the statistical section of this research.

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Mohammad Habibur Rahman – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Nasirul Islam – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Md. Obaidul Haque – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

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Nowab Reza Md. Rashif – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Drafting the article, Final approval of the version to be published

## Guarantor of Submission

The corresponding author is the guarantor of submission.

## Source of Support

None

## Conflict of Interest

Authors declare no conflict of interest.

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**Article citation:** Rahman MH, Islam N, Haque MO, Hossain MZ, Kakuli SA, Rashif NRM. Effectiveness of physiotherapy treatment for post chikungunya arthralgia. Edorium J Public Health 2017;4:69–75.



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